

## BREWING AND DRINKING RECEPTACLE

The present invention relates to a receptacle for containing an ingredient for the preparation of a beverage or other liquid product and in which the ingredient can be mixed or infused with a liquid, such as water, to create the product. More particularly, the invention relates to a disposable drinking receptacle which is intended to be prefilled and supplied with a beverage ingredient, such as tea or coffee, and in which the selected beverage can be brewed, when required, in a controlled fashion, upon the addition of hot or cold water to the receptacle.

It is well known to supply disposable drinking cups containing a powdered or granulated beverage ingredient or teabag in readiness for preparation of a beverage. Such disposable drinking cups are designed to be stacked in nested relation with one another, the ingredient being trapped in an ingredient chamber formed between one cup and the bottom of the next cup above in the stack. When the beverage is to be prepared, the cup is dispensed from the bottom of the stack and water is added to the ingredient contained in the bottom of the cup.

With such so-called "in cup" drinks, there is no effective control of the mixing or infusion of the water with the beverage ingredient contained in the cup, the water simply being added to the ingredient and left to mix or infuse with the ingredient, possibly, assisted by stirring of the resulting beverage. Moreover, it is desirable, for example, in the case of tea or coffee, to remove the teabag, tea leaves or coffee grounds from the cup before drinking the beverage, not only for the purposes of improving the quality of the drink, but also to avoid continued brewing of the beverage after it has attained the desired strength. Depending on circumstances, disposal of the waste ingredient may be messy and inconvenient and, possibly, environmentally unfriendly.

US-A-6 038 963 describes a disposable beverage brewing system for the single cup brewing of a beverage and which comprises inner and outer cups designed so that the inner cup can snugly fit within the outer cup. The inner cup has a bottom wall formed by a filter screen. In one method of using the system, the ingredient to be brewed and water is disposed in the outer cup and the mixture is allowed to brew for as long as the consumer considers

desirable. When the brew is deemed to be acceptable, the inner cup, which serves as a filter press, is pushed into the outer cup and the brewed beverage flows from the outer cup into the inner cup, via the filter, so that any remaining ingredient is trapped between the outer cup and the filter of the inner cup. The beverage can then be consumed without the need to remove the inner cup. In an alternative method of use, the inner cup is prepositioned in the outer cup, ingredient and water are added to the inner cup and stirred. After brewing for the required time, the inner cup is slowly lifted from the outer cup together with any remaining ingredient and is discarded. The brewed beverage remains in the outer cup.

A controllable brewing device in the form of a disposable plastics drinking receptacle has been proposed in WO-A-2004/008925. It comprises an outer cup having an inner cup dimensioned so as to fit or nest within the outer cup and so that it can turn relatively to the outer cup. In one embodiment, a discrete chamber containing tea or coffee is disposed between the bottoms of the two nested cups and the inner cup has perforations in its bottom wall which may be selectively moved into and out of alignment with perforations in the discrete chamber by rotating the inner cup, whereby to control flow of hot water contained in the inner cup into and from the ingredient in the discrete chamber in order to produce a beverage in the inner cup. In other embodiments, specially shaped cavities are provided in wall portions of the outer cup upstanding from the bottom thereof, for cooperating with perforated upstanding wall portions of the inner cup. Ingredients are positioned in the cavities and liquid poured into the inner cup is mixed or infused with the ingredients in the cavities to produce a beverage by rotation of the inner cup relatively to the outer cup so as selectively to admit and shut off flow of liquid between the inner cup and the ingredient cavities. Natural convection and migration of contents also adds to this process.

The above proposal enables the consumer to determine when the brewing process should start and when it should stop and permits brewing of the beverage to the strength desired by the consumer. Also, it avoids the need to remove loose tea leaves, coffee grounds, other solid ingredients or ingredient containing sachets or bags from the cup, after brewing, and the

need to dispose of the ingredients separately. However, the proposal requires the use of either a discrete ingredient chamber or a special arrangement of the ingredient cavities which can create problems in loading the ingredients and assembling the brewing device.

5           Moreover, in order to produce an acceptable brew, generally, it is necessary to squeeze and/or agitate the ingredient and liquid to produce thorough mixing or infusion. For example, upon the addition of hot water to a teabag, air is initially trapped in the teabag and subsequently, the teabag absorbs a quantity of the water and swells. It is desirable to express air and,  
10           subsequently, water and circulate the latter through the bag in order to provide for the required amount of infusion and brewing. No effective provisions are made in the brewing device described in either the above US specification or the International publication for achieving squeezing and/or agitation of the ingredients and added liquid.

15           An object of the present invention is to provide a receptacle which can be prefilled with an ingredient for the preparation of a beverage or other liquid product and which enables improved and controlled mixing or infusion of the ingredient with liquid added to the receptacle in order to prepare the liquid product. Another, more specific object is to provide a combined brewing and  
20           drinking receptacle for a beverage which facilitates initial loading of the beverage ingredient into the receptacle, controlled mixing or infusion of the ingredient with water added to the receptacle in order to prepare the beverage, and disposal of any remaining ingredient after brewing and drinking.

25           To this end, the present invention consists in a receptacle comprising an outer cup, an inner cup nested within the outer cup and turnable relative thereto, an ingredient ~~chamber formed~~ between the inner and outer cups, one or more apertures formed in the inner cup for communicating with the ingredient chamber, and one or more shut-off sections formed on the outer  
30           cup and arranged to control flow of liquid between the inner cup and the ingredient chamber via the aperture(s), in response to relatively turning or twisting the cups. Preferably at least one protuberance projects into the ingredient chamber from at least one of the cups for squeezing and/or

agitating the ingredient in the ingredient chamber in response to relative turning of the cups.

The receptacle according to the invention may be supplied with an ingredient contained in the ingredient chamber. The ingredient may be  
5 disposed in the ingredient chamber either in loose form or in a suitable liquid permeable sachet or bag, such as a teabag. The invention enables the ingredient to be mixed or infused in a controlled fashion with water or other liquid subsequently added to the inner cup by turning or twisting the inner cup relatively to the outer cup in order selectively to allow the liquid to flow into  
10 the ingredient chamber and mix or infuse with the ingredient, or partially or entirely to shut off the flow of liquid to the ingredient chamber. Relatively twisting the cups also causes the protuberance(s) to agitate and/or squeeze the contents of the ingredient chamber so as to enhance mixing or infusion. When, for example, a beverage being brewed has reached a desired strength  
15 in response to relative manipulation of the inner and outer cups, the inner cup is twisted so as to shut off flow of liquid to and from the ingredient chamber and prevent further mixing or infusion of the liquid contents of the inner cup with the remaining ingredient in the ingredient chamber. When the ingredient chamber is shut off, the remaining ingredient can no longer affect the  
20 strength or quality of the resulting beverage in the inner cup. After the beverage has been consumed, the container may be disposed of together with any ingredient or ingredient bag retained within the receptacle. On the other hand, before disposal, the receptacle may be used, if acceptable, to prepare a second cup of the beverage by adding fresh water to the inner cup  
25 and repeating the process

In a preferred embodiment of the invention, the ingredient chamber is formed between the bottom walls of the inner and outer cups which are of circular cross-section and comprise bottom walls and sidewalls extending upwardly and generally outwardly from the bottom walls. A single, relatively  
30 large aperture is formed in the bottom wall of the inner cup and the cooperating shut-off section is formed by a boss projecting into the ingredient chamber from the bottom wall of the outer cup. The upper end of this boss is configured and positioned so as effectively to shut off flow of liquid through the aperture into the ingredient chamber when the aperture is aligned with

the upper end of the boss. A protuberance in the form of a paddle member for agitating and/or squeezing the contents of the ingredient chamber projects downwardly into the ingredient chamber from the bottom wall of the inner cup at a position adjacent the aperture and also serves as a stop defining the fully open and fully shut off positions of the aperture.

Locating the ingredient chamber between the bottom walls of the inner and outer cups has the advantage of providing a brewing receptacle which is easy to load with an ingredient in either loose form or in a bag. It is simply loaded into the bottom of the outer cup, whereafter the inner cup can be readily assembled to the outer cup with the ingredient in place.

The or each paddle member may be perforated and/or include a bottom wall or edge which slopes with respect to the bottom walls of the cups.

The inner and outer cups may be formed with interengaging means which retains the cups in nested relationship whilst enabling them to turn relatively to one another. For example, the interengaging means may be formed by one or more annular ribs on the sidewall of one of the cups engaging in cooperating annular grooves in the sidewall of the other cup. Alternatively, or in addition, it may be formed by interlocking rim flanges which depend downwardly from the lips of the inner and outer cups on the outsides of the cups and which are arranged to interengage when the cups are assembled in nested relation. The interengaging rim flange structure may also be designed to seal the space between the rim flanges so as to alleviate leakage of liquid contents between the cups when a beverage within the receptacle is being drunk by a consumer. For example, the rim flange of the inner cup may be formed with an inwardly projecting annular rib on its inside surface and the outer cup may be formed with a plain downwardly directed rim flange so that, when the inner cup is fully nested within the outer cup, the rim flange of the inner cup resiliently engages over the outside surface of the rim flange of the outer cup and the annular rib on the rim flange of the inner cup snaps into engagement beneath the lower edge of the rim flange on the outer cup. In addition to alleviating the leakage problem, such a rim flange construction also enables an anti-splash lid to be fitted to the

mouth of the receptacle and to be snapped into engagement with the rim flange of the inner cup.

The outer cup may be formed with an array of external ribs which facilitate gripping of the container by a user. They enable the container to be held more comfortably when the content is a hot beverage and this advantage is further enhanced by the insulating characteristics inherent in the double walled construction of the receptacle. The outer cup may have a plain area above and/or below the ribs for printing, embossing or other form of decoration.

Conveniently, the inner and outer cups are thermoformed from sheet plastics material, as thin walled seamless products. Alternatively, they may be injection moulded from plastic granules.

In order that the present invention may be more readily understood, reference will now be made to the accompanying drawings, in which:-

Figure 1 is a perspective view, from below, of one embodiment of the present invention which is a disposable drinking receptacle or cup,

Figure 2 is a perspective view, from above, of the drinking cup illustrated in Figure 1,

Figure 3 is a plan view of the drinking cup,

Figure 4 is a section taken along the line IV-IV of Figure 3,

Figure 5 is an enlarged fragmentary section illustrating the rim flange structure of the drinking cup, and

Figure 6 is an enlarged, half section taken along the line VI-VI of Figure 4 and illustrating stacked drinking cups.

Referring to the accompanying drawings, the disposable drinking receptacle or cup 1 comprises an outer cup component 2 and an inner cup component 3 coaxially nested within the outer cup component. These cup components or cups, as they are herein called, are preferably thermoformed from sheet plastics material, as thin walled seamless mouldings.

Each of the outer and inner cups 2,3 is of circular shape in plan and comprises a bottom wall 4,5 and a sidewall 6,7 extending upwardly and generally outwardly from its bottom wall to a mouth 8 at the top of the receptacle. The sidewall of each cup is terminated at the mouth 8 by a rim flange 9,10. The cups are retained in nested relationship, and so as to be

turnable relatively to one another, by the interengaging structure of the rim flanges 9,10 (as best shown in Figure 5) and interengaging ribs and grooves 11,12 on their sidewalls. The bottom walls 4,5 of the nested cups are spaced apart and define an ingredient chamber 13 therebetween for containing a beverage ingredient capable of mixing with hot or cold water to produce the beverage. For example, the beverage ingredient may be tea in a conventional teabag, loose tea or coffee grounds. A brewing aperture 14 is formed in the bottom wall 5 of the inner cup 3 and communicates with the ingredient chamber 13 under the control of a shut-off boss 15 projecting from the bottom wall 4 of the outer cup. The inner and outer cups can be turned relatively to one another so as selectively to admit or shut off water to the ingredient chamber 13 via the brewing aperture 14.

The sidewall 6 of the outer cup has a plain annular part 16 adjoining its bottom wall 4 and extending upwardly therefrom, and an array of hollow ribs 17 moulded in an annular zone above the plain bottom part 16. These ribs serve to strengthen the sidewall and as a gripping zone where the outer cup may be conveniently gripped by the fingers of a consumer. Above the ribs there is an upper plain annular zone 18 which terminates at the rim flange 9 of the outer cup. The rim flange 9 which forms one component of the interlocking rim structure of the drinking cup extends downwardly from the lip 19 of the outer cup, about the outside of the outer cup. The pair of annular grooves 12 which comprises one component of the interengaging sidewall structure of the outer and inner cups is formed about the inside of the sidewall of the outer cup, immediately below the axial ribs 17.

The shut-off boss 15 is a hollow boss moulded in the bottom wall 4 of the outer cup and projecting inwardly of the bottom wall. It has a part-circular cross-section generally coaxial with the outer cup. Its top wall 20 is substantially planar and perpendicular to the cup axis and its sidewalls 21 are generally outwardly inclined towards the bottom wall.

The sidewall 7 of the inner cup is predominantly of plane configuration except for annular strengthening shoulders 22 moulded about the cup so as to correspond to the top and bottom of the zone of axial ribs 17 in the outer cup. The two hollow annular ribs 11 are moulded on the outside of the inner cup immediately below the lower strengthening shoulder in a position to snap

into engagement with the pair of hollow grooves 12 on the inside of the outer cup. The rim flange 10 of the inner cup, which forms the second component of the interlocking rim structure, extends downwardly about the outside of the inner cup from its lip 23 and is moulded at its lower end with a hollow annular rib 27 projecting on the inside of the flange.

In its bottom wall 5, the inner cup is formed with the brewing aperture 14 which is a part-circular aperture coaxial with the axis of the inner cup and matching, but slightly smaller than, the top end 20 of the shut-off boss 15. Also moulded in the bottom wall 5, adjoining or adjacent the brewing aperture and projecting on the outside of the bottom wall, is a hollow paddle member 24. The latter is of generally sector shape in cross-section with its radially outer end terminating adjacent the periphery of the bottom wall 5. Sidewalls 25 of the paddle member taper downwardly and its bottom wall 26 is generally parallel to the bottom wall of the inner cup. Alternatively, the bottom wall 26 may slope upwardly towards the centre of the inner cup and, in a modification, the paddle member may be perforated. It is of significantly less height than the height of the shut-off boss.

The inner cup is designed to fit snugly within the outer cup 2 when the cups are disposed in nested relation. As the inner cup becomes fully nested within the outer cup, the annular locking ribs 11 of the inner cup snap into engagement with the locking grooves 12 of the outer cup and the rib 27 at the lower end of the rim flange 10 of the inner cup snaps underneath the plane lower end of the rim flange 9 of the inner cup. These interengaging structures securely retain the outer and inner cups 2,3 in nested relationship whilst permitting the cups to turn or twist relatively to one another. When interengaged, the rim flanges of the two cups are resiliently urged together and this rim structure is designed also to prevent leakage between the inner and outer cups and to provide for comfortable drinking.

When interengaged in nested relationship, as described, the bottom wall 5 of the inner cup is resiliently urged against the top end 20 of the shut-off boss 15 and the brewing aperture 14 is shut off from the ingredient chamber 13 when the cups 2,3 are relatively turned so as to align the brewing aperture with the top end 20 of the shut-off boss. Turning of the inner cup relatively to the outer cup is limited by the paddle member 24



which, at one end of the angle of rotation of the inner cup engages the shut off boss 15 to define the shut-off position of the brewing aperture and, at the opposite end, engages the shut-off boss to define the fully open position of the brewing aperture in which the liquid contents of the inner cup can flow  
5 through the brewing aperture into the ingredient chamber.

In use, an ingredient, such as a conventional circular teabag, is loaded into the bottom of the outer cup 2 prior to assembly of the two cups 2,3, as described above. The ingredient chamber 13 is designed so as to allow for expansion of the ingredient when liquid is added and so that the positioning  
10 of the ingredient in the bottom of the outer cup 2, before assembly, does not obstruct subsequent assembly of the inner and outer cups.

When preparing a beverage from an ingredient, for example, a teabag, trapped in the ingredient chamber 13, the inner cup 3 is firstly turned relatively to the outer cup 2 so that the brewing aperture 14 is shut off by the  
15 shut-off boss 15 of the outer cup. Hot water is then added to the inner cup 3 and the latter is turned relatively to the outer cup 2 by gripping the ribbed zone 17 of the outer cup and the rim flange 10 of the inner cup. The inner cup can only be turned in one direction relatively to the outer cup to open the brewing aperture, as dictated by the paddle member 24, and when it is turned  
20 in the relevant direction, hot water flows through the aperture into the ingredient chamber 13. The teabag in the chamber expands on contact with the hot water and, thereafter, the inner cup 3 may be turned in the opposite direction relatively to the outer cup 2, and then backwards and forwards relatively to the outer cup in order to cause the paddle member 24 to  
25 squeeze and agitate the teabag between itself and the bottom wall 4 of the outer cup and thereby enhance infusion of the hot water with the teabag and the brewing process. The resulting tea drink produced flows from the ingredient chamber 13 back into the inner cup 3, via the brewing aperture, and when a brew of the desired strength has been produced, the inner cup is  
30 turned in order to restore it to the initial position in which the shut-off boss 15 shuts off flow of liquid through the brewing aperture 14. Thereafter, milk and sugar may be added to the tea in the inner cup, if required, in order to complete the tea drink.

The cups 2,3 can be twisted relatively to one another selectively to permit and shut off flow of hot water between the inner cup 3 and the ingredient chamber 13 until the desired strength of drink has been produced, thereby enabling the infusion of the teabag with hot water to be effectively controlled without the need to remove the teabag from the container or add further ingredients or water to the inner cup after initial infusion. If adequate ingredient is loaded into the ingredient chamber 13 when the drinking cup is initially assembled, there may be sufficient ingredient to allow for the preparation of more than one acceptable drink. Hence, after first drink has been consumed, hot water may be added to the inner cup member 3 which is again turned to open the brewing aperture and enable the next charge of water to infuse with the tea in the teabag and thereby produce a second drink. The inner cup 3 is turned relative to the outer cup 2 to shut off the aperture 14 when the second drink has acquired the desired strength.

The drinking cup is conveniently gripped by a consumer at the ribbed zone and the ribs 17 serve to insulate the user's fingers from a hot drink in the drinking cup. The insulation is enhanced by the double walled structure provided by the assembled inner and outer cup components 2,3. An anti-splash lid may be fitted to the mouth 8 of the drinking cup by simply snapping the lid into engagement with the lower edge of the rim flange 10 of the inner cup. Finally, when the disposable drinking cup has been used, the teabag or any other remaining ingredients in the ingredient chamber 13 are automatically disposed of with the drinking cup.

A multiplicity of the drinking cups may be stacked in nested relation for storage and transportation purposes. As illustrated in Figure 6, when stacked in nested relation, the stacked cups are prevented from wedging or jamming together in the stack by the bottom of an upper drinking cup resting, via the bottom wall 4 of its outer cup component 2 resting on the bottom wall 5 of the inner cup component of the next drinking cup below.

Whilst a particular embodiment has been described, it will be understood that modifications can be made without departing from the scope of the invention as defined by the appended claims. For example, the interengaging rim structure may be omitted if the outer and inner cups 2,3 can be satisfactorily retained in nested engagement by the sidewall

interengaging structure alone. In this event, the rim of the outer cup 2 may simply be moulded with a narrow projecting lip which engages the inside of the lip 23 of the rim flange 10 of the inner cup. In a modification particularly suitable for brewing a beverage with loose ingredients, the single brewing aperture 14 may be replaced by a perforated section having perforations sufficiently small so as substantially to prevent flow of loose ingredient from the ingredient chamber into the inner cup which contains the drinkable beverage. Marks may be printed or embossed on the outside of the outer cup 2 in positions corresponding to the stop positions defined by the paddle member 24 to provide a visual indication of the relative positions of the inner and outer cups and, hence, the brewing aperture 14 and the shut off boss 15. Furthermore, whilst the invention has been particularly described as a drinking cup suitable for brewing a desired beverage, it will be apparent that the receptacle of the invention is also suitable for use in other circumstances, such as, for mixing alcoholic drinks, medicines and paints.